PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION See Form PCT/IPEA/416	
Case 3557		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/SE2004/001635	09.11.2004	21.11.2003
International Patent Classification (IPC) or national classification and IPC		
See Supplemental Box		
Applicant		
AKZO NOBEL N.V. et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 1 sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
27.05.2005	03.02.2006
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Moa Grönkvist/MP Telephone No. +46 8 782 25 00

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Cover sheet

INTERNATIONAL PATENT CLASSIFICATION (IPC):

C01B 33/142 (2006.01)
H01M 8/14 (2006.01)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2004/001635

Box No. I Basis of the report

1. With regard to the language, this report is based on:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of:

☐ international search (Rules 12.3(a) and 23.1(b))

☐ publication of the international application (Rule 12.4(a))

☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-8 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ the claims:

pages _____ as originally filed/furnished

pages* _____ as amended (together with any statement) under Article 19

pages* 9 received by this Authority on 30-01-2006

pages* _____ received by this Authority on _____

☐ the drawings:

pages _____ as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2004/001635

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-13	YES
	Claims		NO
Inventive step (IS)	Claims	1-13	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-13	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The claimed invention relates to a method for preparing a solid composition comprising silica sol having an S-value from 15% to 45 % and a mineral acid. The weight ratio of silica to mineral acid is from 1:100 to 25:100. The claims also concern a method for producing a battery, a solid composition comprising a network of silica particles and a mineral acid and use of the composition in batteries.

The object of the invention according to the description is to provide longer service life in batteries, shorter gelling times and improved gel strength.

Among others, the following documents are cited in the International Search Report:

D1: US 5664321
D2: EP 0537373
D3: US 6372806
D4: US 5368833

The most relevant prior art is described in D1 and D2.

Document D1 relates to a process for the production of a lead accumulator having an electrolyte in which essential constituents includes sulphuric acid and a gel-forming agent. The electrolyte comprises aqueous silica sol and sulphuric acid. Orthophosphoric acid can also be added. The aqueous silica sol is desirably added in such an amount that the solids concentration of the electrolyte, with respect to the total weight thereof, is 3 to 20% by weight. Document D2 relates to a colloidal electrolyte used in the storage battery. The electrolyte consists of Silica sol, water and sulphuric acid in specific proportions (see claim 1 and exemple 7-9). Documents D3 and D4 concerns liquid silica sols which are mixed with different mineral acids.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: V

Compositions comprising silica sol having an S-value from 15% to 45 % are not known from D1 or D2. From D3 and D4 silica sols with s-values from 15% to 45 % are known but no reference is made to the relationship between silica sol and mineral acid. On the contrary, the products in D3 and D4 are liquid sols useful in the paper industry.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed composition of silica and mineral acid. Therefore, the claimed invention is not obvious to a person skilled in the art.

Consequently, claims 1-13 is novel, considered to involve an inventive step and to be industrially applicable.

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Claims

1. Method of preparing a composition comprising mixing a silica sol having an S-value from about 15 to about 45 % and a mineral acid, wherein the weight ratio of silica to mineral acid is from about 1:100 to about 25:100.

2. Method according to claim 1, wherein the S-value is from about 15 to about 40 %.

3. Method according to claim 1 or 2, wherein the S-value is from about 12 to about 35 %.

4. Method according to any of claims 1-3, wherein the silica sol has a specific surface area from about 400 to about 1200 m^2/g.

5. Method according to any of claims 1-4, wherein the silica sol has a specific surface area from about 500 to about 1000 m^2/g.

6. Method according to any of claims 1-5, wherein the silica sol has a specific surface area from about 600 to about 900 m^2/g.

7. Method according to any of claims 1-6, wherein the mineral acid is sulphuric acid.

8. Method according to any of claims 1-6, wherein the mineral acid is hydrochloric acid, nitric acid, phosphoric acid, and mixtures thereof.

9. Method according to any of claims 1-8, wherein orthophosphoric acid and/or sodium sulphate is further added.

10. Method of producing a battery comprising providing a composition according to any of claims 1-9.

11. Composition obtainable by the method according to any of claims 1-10.

12. Composition comprising a network of silica particles and mineral acid, wherein the silica particles have a particle size of from about 2 to about 7 nm, and the weight ratio of silica to mineral acid is from about 1:100 to about 25:100.

13. Use of a composition according to any of claims 11-12 as a gelled electrolyte in a battery.